US Application 10/591,313
Declaration of Inventor Gerard Short

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patent Application No. 10/591,313

Applicants: Gerard Short;
Boris Bobyreff; and
Peter Jackson.

Filed: 2 March 2005

TC/AU: 1762

Examiner: Robert D. Harlan

Supervisory Examiner: David W. Wu

Docket No.: FISHR25.001APC

Customer No.: -

Title: PAINTABLE PRIMER SYSTEM

Commissioner for Patents P.O. Box 1450
Alexandria, VA 22313-4150

DECLARATION UNDER 37 C.F.R. § 1.132 of Mr. Gerard Short

I, Gerard Short, hereby declare the following:

1. I am a named inventor in the above-captioned patent application.

2. I am currently the Managing Director of Polycoat Pty Ltd, the assignee of the above-captioned application. I am also the Managing Director of Australian Quality Lacquers (AQL), the company commercializing the technology that is the subject of the above-captioned application. At the time of making the invention that is the subject of the above-captioned application I was also Managing Director of Polycoat Pty Ltd. The other inventors of the above-captioned application, Boris Bobyreff and Peter Jackson were employed by AIPAC Pty Ltd a related company which developed the technology that is the subject of the above-captioned application.

3. I am familiar with the technology of paintable primers, paints and adhesion promoters for primers and paints.

4. Prior to the subject invention, a skilled person would not have been motivated to combine the components of the dispersions and primers detailed in the specification of the above-captioned application to achieve a dispersion and/or primer that would adhere to a plastic, metal or composite substrate. There is no teaching, suggestion or motivation

in the prior art to combine a thermoplastic cellulose polymer or a derivative thereof, a phthalate ester of a C_1-C_6 alkylated aromatic alcohol, a surfactant, a lower alkyl methacrylate polymer with an alkaline earth metal salt of a C_9-C_{20} aliphatic fatty acid for this purpose.

5. The Examiner in the above-captioned application has cited Obie et al., WO 01/35719 (hereinafter "Obie") in combination with Payne, Organic Coating Technology, volume 1, page 240 (hereinafter referred to as "Payne"). An alkaline earth metal salt of a C_9-C_{20} aliphatic fatty acid would only be added to a wood stain formulation to reduce the gloss of the stain and give a more pleasing satin appearance. A person of skill in the art would not be seeking a reduced gloss effect in a dispersion or primer of the invention. Surprisingly, the effect of the alkaline earth metal salt of a C_9-C_{20} aliphatic fatty acid in the present invention is to generate hydrophobic properties in a primer comprising the dispersion. In this way the alkaline earth metal salt of a C_9-C_{20} aliphatic fatty acid of the dispersion is directly responsible for superior water and corrosion resistance in the primer. A skilled person would not have expected this advantage from the teachings in the prior art. Additionally, prior to the provision of the subject invention, there was no reasonable expectation that using an alkaline earth metal salt of a C_9-C_{20} aliphatic fatty acid in a dispersion would generate a primer with improved water and corrosion resistance and that would adhere to a plastic, metal or composite substrate.

6. To illustrate the advantages and superior properties of the subject invention present below are some test results using dispersions and primers according to the present claimed invention.

7. **Exhibit GS-1** is titled "INDEPENDENT TESTING REPORT December 2005" and analyses the adhesion of a range of basecoats and solid colour overcoats applied on top of the White Primer on sample panels of electro-coated metal. The White Primer comprises the first, and second dispersions as described in the specification associated with the above-captioned application. As stated in this independent test report after 250 hours and 500 hours of accelerated weather testing according to an Australian Standard there was no visual signs of deterioration of the painted surface and no evidence of delamination.

8. **Exhibit GS-2** is titled "INDEPENDENT TEST REPORT December 2005" and analyses the adhesion of a PPG waterborne base coat under a standard PPG clear top coat applied on top of a) the Clear Primer and b) the White Primer. The White Primer comprises the first and second dispersions as described in the specification associated with the above-captioned application. The substrates were panels of electro-coated metal. As stated in this independent test report after 250 hours and 500 hours of accelerated weather testing according to an Australian Standard there was no visual signs of deterioration of the painted surface and no evidence of delamination.

9. **Exhibit GS-3** is titled "TECHNICAL REPORT 11113" and analyses the adhesion of the White Primer, a metallic base coat and a clear gloss finish applied on a sample of polypropylene. As stated in the report, even after 500 hours of accelerated weather testing, there is no evidence to suggest that the micro cracking was caused by failure at the primer level and that the failure instead seems to come from the surface of the coating system. As noted in the independent report, adhesion of the primer to the polypropylene was not affected by the accelerated weather testing.

10. **Exhibit GS-4** is titled "Technical report 11112" and analyses the adhesion to black and grey polyethylene panels of a coating system including the adhesion promoter, the White Primer, a metallic base coat and a clear gloss finish. Again, the accelerated weather testing failed to show any evidence that the micro-cracking was caused by failure at the primer level. Additionally, adhesion of the primer to the polyethylene was not affected by the accelerated weathering.

11. **Exhibit GS-5** is titled "Internal Aluminium Corrosion Test" and analyses the Metal Primer without a rust inhibitor (the RCP001 Primer) and the Metal Primer with addition of a rust inhibitor (LUC1-4) applied to 2000 and 7000 grade aluminium. LUC1 included 1% of a rust inhibitor and eliminated the calcium carbonate; LUC2 included 1% of a rust inhibitor and maintained the calcium carbonate; LUC3 included 3% rust inhibitor; and LUC4 included 5% of rust inhibitor. This trial was completed to determine the impact of the rust inhibitor at varying levels against the Metal Primer. After thirty-seven (37) days of continuous submersion the cross-hatch testing showed that only the primer area of LUC1 lost adhesion and that there was no loss of adhesion over the top-coated areas.

12. **Exhibit GS-6** is titled "Anodised Aluminium" and documents a test on a gun faring of a MIG-17 washed with metal conditioner and coated with two coats of the RCP001 Primer. As shown, crosshatch testing showed absolute adhesion.

13. **Exhibit GS-7** is titled "Beechcraft Baron VH-EPJ" and documents a test in which a wing of an aeroplane was cleaned with deoxidine and coated with the RCP001 Primer. As documented in this Exhibit, in five (5) months of continuous operation there was no occurrence of a new outbreak of corrosion and no disbanding of the finish coat paint file.

14. **Exhibit GS-8** is titled "Fairchild Merlin Engine Intake Cowling" and documents a test in which engine inlet cowls were cleaned with deoxidine and coated with the RCP001 Primer and overcoated with Dupont Imron 700. The current and conventional manufacturer specified coating systems do not provide sufficient adhesion of coatings to the cowlings and delamination would generally occur in sheets. In four (4) months of continuous operation there was no

reoccurrence or new outbreak of the corrosion noted previously with conventional coating and no disbanding of the finish coat paint file. These surprising results occurred in spite of the fact that the paint edge is exposed to some of the most aggressive airflow on the aircraft.

15. **Exhibit GS-9** is titled "TPE-331 Magnesium Alloy Intake Casting" and documents an example in which the RCP001 Primer was applied to magnesium alloy intake castings of aircraft engines. As noted in the Exhibit, the aircraft manufacturer's coating system would not provide sufficient adhesion and would cause the ingestion of foreign bodies into the engine; leading to severe engine damage. Prior to the provision of the subject invention the intake casings would be left uncoated and the engines would be disassembled for corrosion protection and treatment. After application of the RCP001 Primer and an overcoat of Dupon Imron 700 in five (5) months of continuous operation there was no reoccurrence or new outbreak of the corrosion noted previously with conventional coating and no delamination of the finish coat paint file. If it was not for the subject invention the subject aircraft would have had to be decommissioned for a week to complete the repairs and maintenance discussed above. This highlights yet another advantage of the subject invention, namely less downtime of coated products and less lost of revenue.

16. **Exhibit GS-10** is titled "DHC2FP VH-SEB Sea Plan – Corrosion Test: and documents a comparison between areas of the craft coated with the RCP001 and areas coated with a conventional aviation primer and topcoat system. Significantly, the floats that were painted with the RCP001 Primer show no signs of filiform corrosion.

17. **Exhibit GS-11** is titled "Subject: AQL Primer – a Seaplane Owner and Operator's Perspective" contains an endorsement from an owner/pilot. The endorsement notes the non-hydroscopic nature of the primer makes it a natural choice for marine environments and aviation purposes. The endorsement also highlights some of the other advantages of the subject invention, namely lack of toxicity, flexibility in timing of the application of top coat and durability.

18. **Exhibit GS-12** is titled "NSW Maritime Aluminium Work Vessel which primarily shows the reduced time taken to paint using the Metal Primer of the invention and also states increased corrosion protection. This Exhibit notes that using the subject invention all filiform corrosion is prevented. Some addition advantages of the subject invention are highlighted in this Exhibit such as, drastic reduction in the time to paint, savings on topcoat usage, increased corrosion protection, less product required and no need for an intermediate primer.

19. **Exhibit GS-13** is titled "NSW Maritime Aluminium Work Vessel – Follow Up" states that 2 years after no discernible signs of delamination or undercreep are apparent and there is little or no

corrosion. Ordinarily filiform corrosion would be expected. The results of the subject invention are even more surprising because little to no corrosion is evident in the exposed areas.

20. **Exhibits GS-14, GS-15 and GS-16** are copies of photos showing coating of a polyethylene (PE) replica ride on car for children. Previous coatings with conventional primers and coatings did not adhere. The Plastic Hi-Fill primer of the invention resulted in 100% adhesion. This result should not be undervalued, prior to the provision of the primers and dispersions of the invention it was not possible to adequately paint PE.

21. **Exhibit GS-17** is a copy of a photo showing application of PE primer to a bull bar for a semi trailers. The company providing the bull bar now stipulates that the only method to paint PE is the Plastic Hi-Fill Primer of the subject invention.

22. **Exhibit GS-18** is a copy of a photo showing coating of PE buoy used by NSW Maritime services. As noted above, before provision of the subject invention, painting of PE substrates was impossible or at least very difficult. The subject invention not only enables painting of PE substrates but is sufficiently robust to withstand the rigours of a maritime environment, such as, encountered by a buoy.

23. I hereby declare that all statements made herein of my own knowledge are true, that all statements made on information and belief are believed to be true, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 13th April, 2011

Gerard Short

Gerard Short

EXHIBIT GS-1

Architectural & Industrial Coatings

Product Data Sheet

INDEPENDENT TESTING REPORT December 2005

PRODUCT DATA SHEET · PRODUCT DATA SHEET

EZI PRIME TLS001 WHITE METAL PRIMER
UV EXPOSURE PERFORMANCE

INTRODUCTION

Australian Quality Lacquers (AQL) submitted eight sample panels of electro- coated metal, primed with **TLS001 EZIPRIME – White Automotive Primer** and over coated individually with:

1. PPG basecoat and solid colour
2. DuPont basecoat and solid colour
3. Spies Hecker basecoat and solid colour
4. Sikkens basecoat and solid colour
5. Glassurit basecoat and solid colour
6. Protec basecoat and solid colour and
7. DeBeer basecoat and solid colour.
8. Concept Solid

Note: Each basecoat colour was top coat cleared.

The intention was to evaluate weathering performance of the primer in conjunction with the above major paint brands.

OBSERVATION

The QUV accelerated weathering machine was used as it has the aggressive UVB-313 lamps with an 8 hours cycle of UV exposure followed by 4 hours cycle of 100% humidity at 50°C.

At 250 hrs exposure, there were no visual signs of deterioration of the painted surface. The adhesion test was according to the guidelines set out in ASTM 1580-408-4.

All systems passed the cross hatch test and the panels were resubmitted to complete 500 hours exposure. At this time the panels were withdrawn and re-examined.

There was no deterioration of the top coat and crossed hatched adhesion test was carried out in accordance to ATSM1580-408-4.

RESULTS

The visual examination and the crossed hatched adhesion tests of the exposed panels passed **ALL** required tests and show no signs of delaminating.

CONCLUSION

After 500 hours of exposure in the QUV test equipment, the test panels show no evidence of delamination and excellent bond between the TLS001primer and all the top coats used to complete this accelerated weathering test.

7 Lackey Rd, P.O. Box 820, Moss Vale, NSW 2577 Australia.
Phone: ***(02) 4869 1441***

EXHIBIT GS-2

INDEPENDENT TEST REPORT December 2005

Testing Waterborne Base coat preprimed with
EZI PRIME TLS001 & WDC001 METAL PRIMERS FOR
UV EXPOSURE PERFORMANCE
A & I COATINGS—Technical Service Department
Test panels prepared by AQL

► ***Introduction:***

Australian Quality Lacquers (AQL) submitted two sample panels of electro-coated metal, one primed with **WDC001 – Clear EZIPRIME** and the other with **TLS001 - EZIPRIME White.** Both were over-coated with PPG waterborne base coat then a standard PPG clear top coat was applied.

The intention was to evaluate weathering performance of the primer in conjunction with the waterborne base coat to determine resistance characteristics.

The QUV accelerated weathering machine was used as it has the aggressive UVB - 313 lamps with an 8 hour cycle of UV exposure followed by a 4 hour cycle of 100% humidity at 50°C.

► ***Observation:***

At 250 hours exposure, there were no visual signs of deterioration of the painted surface. The adhesion test was according to the guidelines set out in ASTM1580-408-4.

Both panels passed the cross hatch test and then were resubmitted to complete 500 hours exposure. At this time the panels were withdrawn and re-examined.

Again there was no deterioration of the coating when the crossed hatched adhesion test was carried out in accordance to ATSM1580-408-4.

► ***Results:***

Both panels passed the QUV test with respect to no loss of adhesion or lamination of the waterborne base coat from the substrate or the paint systems applied using the **WEC001 - Clear EZIPRIME** and the **TOLS001 - EZIPRIME White.**

► ***Conclusion:***

After 500 hours of exposure in the QUV test equipment, the test panels show no evidence of delamination and very good bond between both primers and all the top coats used to complete this accelerated weathering test.

Signed by Frank Jiang.....
Chief Chemist

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EXHIBIT GS-3

TECHNICAL REPORT 11113

UV EXPOSURE PERFORMANCE
PROMOTING PRIMER FOR POLY PROPYLENE
A & I COATINGS—Technical Service Department
Test panels prepared by AQL

► ***Introduction:*** One sample was submitted of poly propylene, overcoated with a navy blue metallic automotive type finish. The coating system comprised of an adhesion promoting primer, metallic base coat, and clear gloss finish. The intention was to evaluate weathering performance of the primer. The QUV accelerated weathering machine was used - using the aggressive UVB—313 lamps for an 8 hour cycle UV exposure followed by a 4 hour cycle of 100% humidity at 50°C.

► ***Observation:*** After 200 hours exposure, the film started developing micron cracking.

► ***Results:*** At 500 hours exposure, the panel was withdrawn and normalized in the laboratory overnight before examination.

The panel showed minor micro cracks that do not appear to go through to the substrate.

► ***Conclusion:*** At 500 hours of exposure in the above QUV test is approximately equivalent to 48 months exterior exposure. While the long term durability of the total coating system is of concern, there is no evidence to suggest that the micro cracking has been caused by failure at the primer level. In fact, in this case, the failure seems to come from the surface of the coating system. Adhesion of the primer to the poly propylene has not been affected by the accelerated weathering.

Signed by Frank Jiang .....
Chief Chemist

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EXHIBIT GS-4

TECHNICAL REPORT 11112

UV EXPOSURE PERFORMANCE OF ADHESION PROMOTING PRIMER FOR POLY ETHYLENE

INTRODUCTION

Two samples were submitted, both overcoated with a metallic automotive type finish. Both panels were poly ethylene, sample 1 being black in colour, and sample 2 being grey. The coating system in each case comprised of an adhesion promoting primer, metallic base coat, and then clear gloss finish. The intention was to evaluate weathering performance of the primer. The QUV accelerated weathering machine was used for testing – using the very aggressive UVB-313 lamps for 8 hours cycle UV exposure, followed by 4 hours cycle of 100% humidity at 50°C.

OBSERVATION

The coatings showed yellowing after 100 hours exposure. After 200 hours exposure, the film started developing micro-cracking.

RESULTS

At 500 hours exposure, the panels were withdrawn and normalised in the laboratory overnight before examination.
Sample 1 shows minor cracks through to the substrate.
Sample 2 shows more obvious micro cracking through to the substrate.

CONCLUSIONS

500 hours of exposure in the above QUV test is approximately equivalent to 48 months exterior exposure. While the long term durability of the total coating system is of concern, there is no evidence to suggest that the micro cracking has been caused by failure at the primer level. Adhesion of the primer to the poly ethylene has not been affected by the accelerated weathering.

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7 Lackey Rd, P.O. Box 820, Moss Vale, NSW 2577 Australia. Phone: ***(02) 4869 1441***

Internal Aluminium Corrosion Test

Substrate : 2000 & 7000 grade Aluminium
Date : December 2008

Synopsis
To test the inclusion of a corrosion inhibitor in the AQL Aviation primer coating system on 2000 & 7000 grade Aluminium to determine corrosion prevention eliminating the use of chromates.
The standard AQAviation - RCP001 has been included on the panels (contains no inhibitor) alongside the test fromula (with inhibitor) to determine if additional corrosion protection is achieved.

AQL Application
The surfaces were cleaned with AQL's **cleanSteel** - CPD001 Metal Conditioner. The cleanSteel was applied to both aluminium surfaces, using a brush, the conditioner was worked over the surface and neutralised by washing the cleaned area with water and dried with a lint free cloth. Alodine 1200L was applied to the cleaned substrate and was allowed to etch the surface.

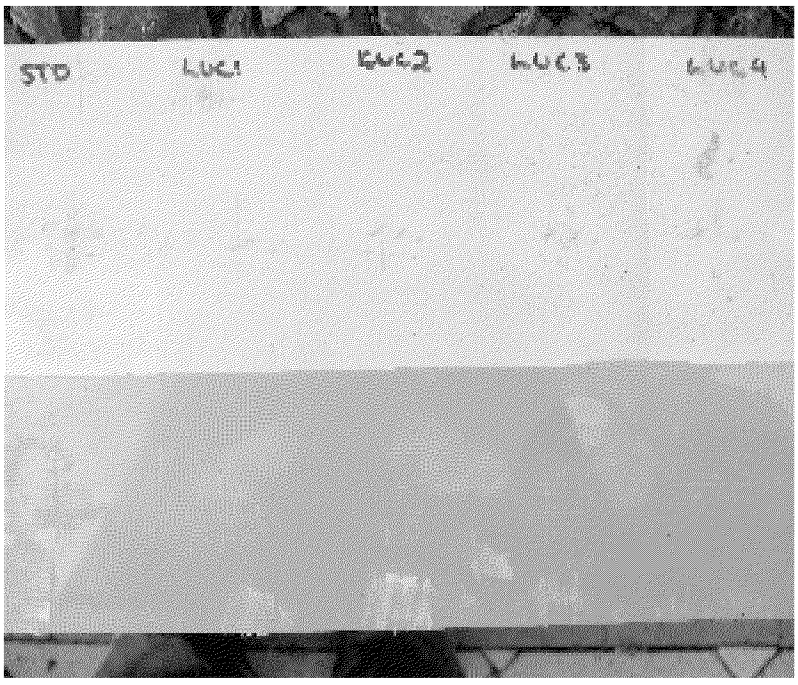
The dried surfaces were coated with two coats of the trial Primers, the first primer coat being a light coat, allowed to flash off for 30 seconds and an additional wet coat applied. The primer was allowed a 5 minutes flash off, before the application of the topcoat with Imron 700, date completed was 13th January, 2009.

The panels were allowed to cure seven (7) days under normal sunlight and then baked for 1 hour.

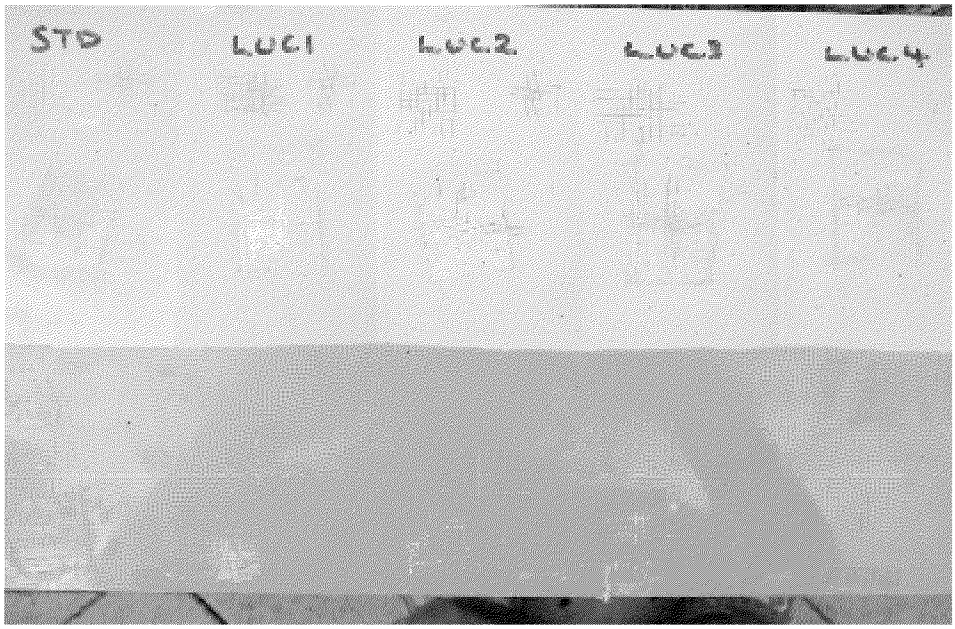
An OEM standard crosshatch was performed on the topcoated and primer only sections of the panels, using a 2mm and 1mm (over the primer only) crosshatching claw and 3M 8981 tape was applied to the crosshatched areas.

(Note: There are 5 trial primers – the standard RCP001, LUC1, LUC2, LUC3 and LUC4 refer photo below.)

2024T3 Alclad Aluminium



7075T6 series Aluminium



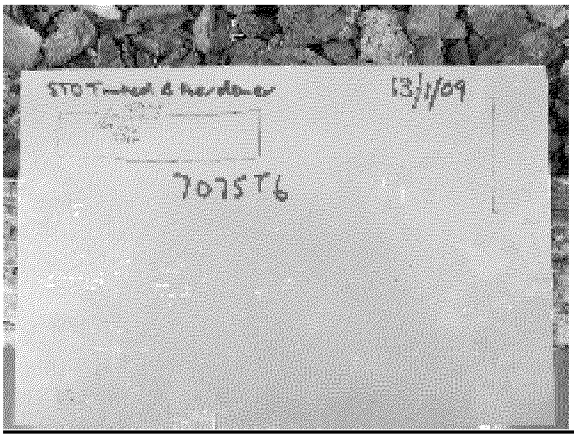
Salt Bath Immersion

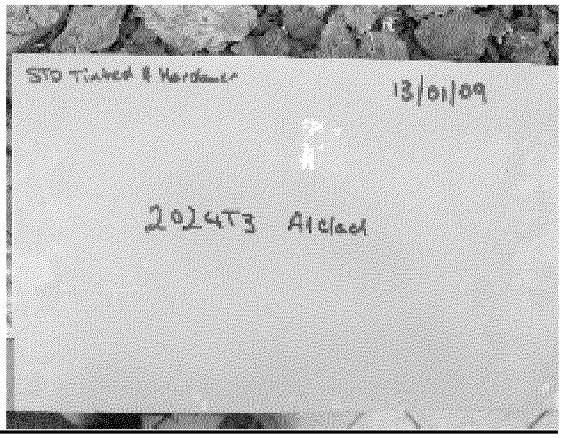
The aluminium panels (2000 and 7000 series) were placed in the salt bath on the 23th January, 2009.

Each panel is removed from the salt bath every 2 hours from 6.00am until 10 p.m and are placed back into the bath during the night.

Stand Alone Primer

AQL single pack primer does perform as a stand alone solvent resistant coating. This primer has been applied to the reverse side of the above top coated panels (on both 2000 and 7000 series) and has been subjected to the same salt immersion test schedule.





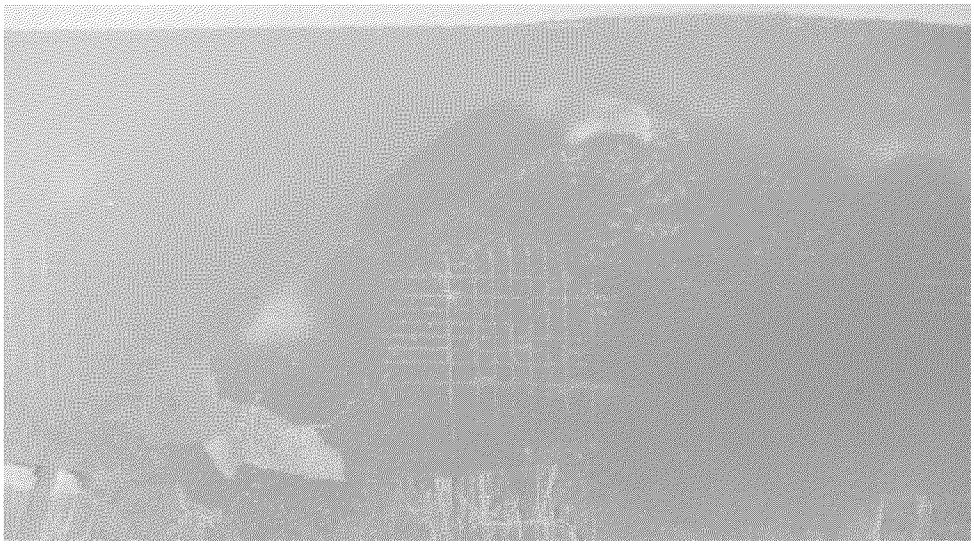
On the 25th February, 2009 the stand alone (7000) panel was cleaned and subjected to the 50 double MEK rub test. The coating was allowed 3 weeks to cure prior to completing the test. The marked box indicates the area tested and the test did not remove the stand alone primer.

(Note: Both panel have small exposed metal areas this is due to firstly the 7000 sheet tape had fallen on to the surface while still fresh and on the 2000 series the adhesive tape was left on the panel while soaking in the salt bath. It was removed on the 7th March while retesting the the previously cross hatch areas.)

Examination of the Panels

The panels are visually inspected daily. All the pictures below were taken on 15th March, 2009 (51 days after the salt bath was commenced).

LUC3 Primer - On the 10th March a white spot of aluminium oxide was detected on the top coated section marked LUC3 on both the 2000 and 7000, located on the line of the cross hatching performed prior to the salt bath immersion (attached below).

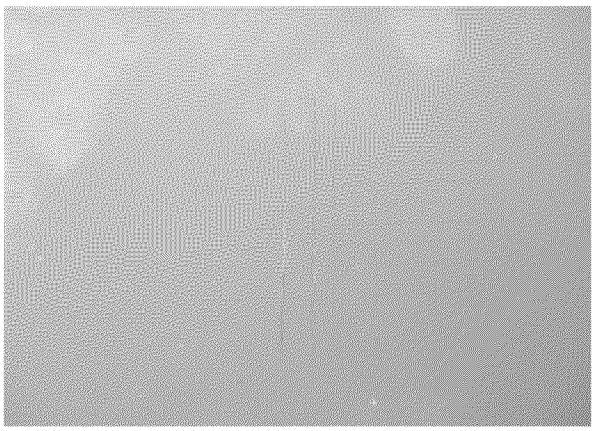


2024T3 Series

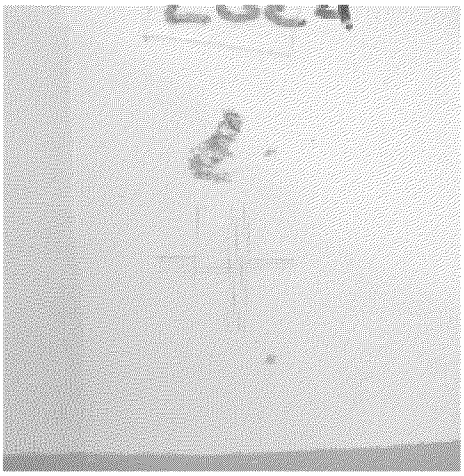
7075T6 Series

Note: The white portion shown below the cross hatching is the thread of the 8981 tape applied and left on the substrate after the initial cross hatching. The salt water destroyed the tape but left the thread.
On examination of the other coatings, notably LUC4 and the Std RCP001, it appears that there is a darking of the metal on the scribe lines of the cross hatching but as shown on the pictures below there is no aluminium oxide build up evident as at the 18th March, 2009

Top Coated LUC4 (2024 series)

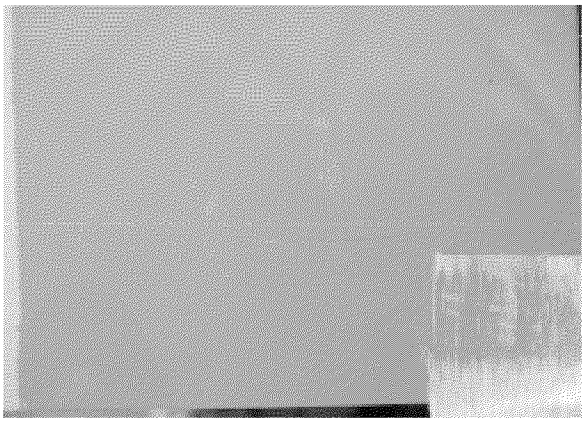


Top Coated LUC4 (7000 series)

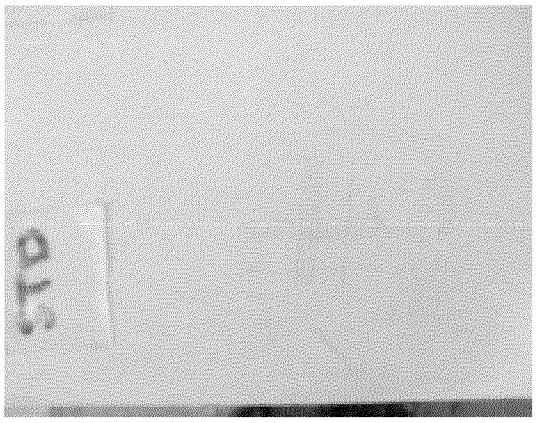


Primer Only LUC4 (2024 series)

Note: The brown mark on the primer LUC4 is bird dropping that occurred while the panel was out of the Salt bath. It was decide not to clean the contaminated area and see the effect on the primer.



Top Coated Std RCP001



Primer Only Std RCP001

There does not appear to be a great difference between the LUC4 and the Std RCP001 to date. The completion of the actual salt spray test will clarify the long term effects on these two primers.

Additional Testing

After 37 days of continuous submersion of both panels, the panels were cleaned with warm soapy water, dried and 3M–8981 tape was applied over the previously crosshatched area. The test was to note if there was any loss of adhesion or undermining of the topcoat from the previously cross-hatched areas due to the salt bath soaking of the panels.

Result: All 10 crosshatched areas were re-tested and only the primer area of LUC1 lost adhesion but there was no loss of adhesion over the topcoated areas.

NOTE: I have elected not to pre strip any panel until the morning of our meeting, at which time we can all see if there has been any under creep corrosion on the panels.

Case study

Anodised Aluminium

Aircraft : MIG-17
Substrate : Anodised Aluminium
Part : Gun Faring on a MIG-17
Date : December 2006

Synopsis

The coating of Sulphuric Anodised Aluminium is to provide additional corrosion protection. Abrading of the substrate is not an option, as it will remove the coating, leaving only chemical adhesion as an option. Due to the nature of the Anodised Aluminium surface, ordinarily, it is exceptionally difficult to penetrate via chemical adhesion, and therefore gain full and reliable adhesion of a coatings system.

AQL Application

The tests performed in this case were over Anodised Aluminium. The surface was cleaned with AQL's CPD001 Metal Conditioner and left for one minute. This was hosed off and left to dry standing. Once dry, two coats of AQL's RCP001 Aviation White Metal Primer were applied. 5 minutes flash off was allowed before the application of the topcoat. In this case 2K Lesonal Automotive topcoat was applied. An OEM standard crosshatch using a 2mm crosshatching claw and 3M 8981 OEM tape was performed 12 hours after coating [these can be seen under both the primer (white) and topcoat (orange)]. Absolute adhesion was achieved.

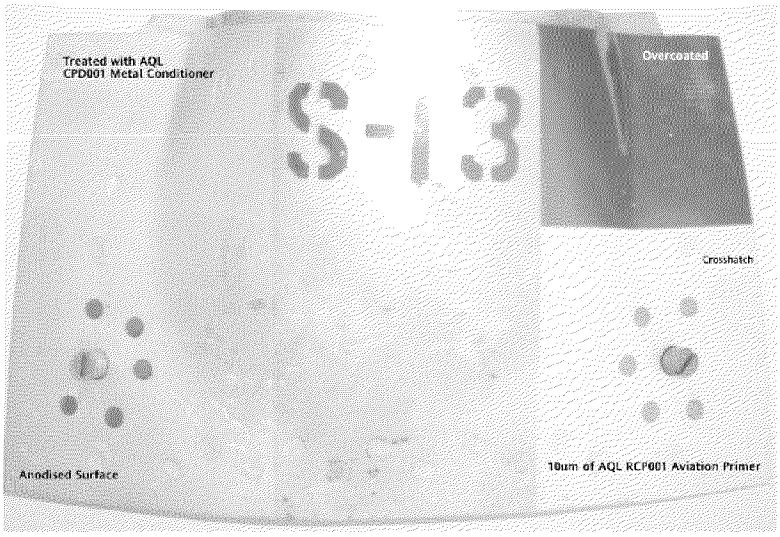


EXHIBIT GS-7

Case study

Beechcraft Baron VH-EPJ

Customer : Winrye Aviation
Chief Engineer : Michael Chadwick
Aircraft : Beechcraft Baron VH-EPJ
Date : December 2006

Aircraft Usage

The two engines on this particular aircraft operate in a very volatile environment with temperatures ranging from +45°C to -20°C and from 0 to 210 knots airspeed in all types of weather, up to 12 000 feet. This aircraft operates in all weather conditions from fine and clear to severe thunderstorms, which includes icing.

Synopsis

The aircraft was brought in by the customer due to a corroded spar, which needed to be replaced on the right hand wing. The entire wing had to be stripped and re-coated. Following the specified coatings system, which in this instance was “DuPont Imron”, the anticipated downtime would have been 18 hours. This would is taking into consideration scouring, the 12 hour flash off time the primer requires and then application of the topcoat. Due to the strontium chromate content of the manufacturer specified primer & alodine process, extensive personal protection equipment would have to be utilised. The run off from the application would have had to be disposed of via proper HAZMAT procedures. The AQL RCP001 Aviation White Metal Primer eradicated all of this.

AQL Application

After re-assembly, the wing was not scoured, but was instead cleaned with “Deoxidine”. The AQL RCP001 Aviation White Metal Primer was then applied to the substrate, leaving a 10 minute flash off time, and then over coated with Du Pont Imron 700. The entire coating time was 4 hours.

Infield Results

In 5 months of continuous operation there has been nil occurrence or new outbreak of corrosion noted and nil disbonding of the finish coat paint film. The aircraft is currently operating in the Philippines.

Benefits

The use of the AQL RCP001 Primers decreased the overcoating time by 75%, saving the customer downtime costs. Furthermore, no costs of abrasives or hazardous waste removal of the remaining strontium chromate primer in the pressure pots applied. Labour costs to the applicator were significantly reduced as well.

Photographs

Produced March 2007

EXHIBIT GS-8

Case study

Fairchild Merlin Engine Intake Cowling

Customer : Winrye Aviation
Chief Engineer : Michael Chadwick
Aircraft : Fairchild Merlin IIIA VH-SSM
Date : January 2007

Aircraft Usage

The two engines of this particular aircraft operate in an environment which varies from +36°C to -40°C and from 0 to 268 knots airspeed in all types of weather, up to a height of 27 000 feet. This aircraft operates in all weather conditions from fine and clear to severe thunderstorms including icing.

Synopsis

These engine inlet cowls pictured are constructed of aluminium. The current manufacturer specified coatings systems did not provide sufficient adhesion of coatings to the cowlings, as delamination would generally occur in sheets. It was suggested by the AQL Aviation experts "the key issue is that although an elastic additive can be added to topcoats, current primers do not offer any flexibility and due to the coefficient of expansion, delamination is a common problem."

AQL Application

The two castings were cleaned with "Deoxidene" and when dry, coated with AQL's RCP001 Aviation White Metal Primer and given 10 minutes to flash off. The primer was then overcoated with Dupont Imron 700, as this was the specified topcoat.

Infield Results

In 4 months of continuous operation there has been nil reoccurrence or new outbreak of the corrosion noted previously and nil disbonding of the finish coat paint film. This is in spite of the fact that the paint edge is exposed to some of the most aggressive airflow on the aircraft.

Photographs

EXHIBIT GS-9

Case study

TPE-331 Magnesium Alloy Intake Casting

Customer : Winrye Aviation
Chief Engineer : Michael Chadwick
Aircraft : Fairchild Merlin IIIA VH-SSM
Date : January 2007

Aircraft Usage
The two engines from this aircraft operate in a volatile environment, one that has temperatures vary from +36°C to -40°C and from 0 to 268 knots airspeed in all types of weather.

Synopsis
When leaving Magnesium Intake Castings uncoated, the impact of foreign bodies and the elements can cause damage to the intake casting leaving it very susceptible to filliform corrosion. These engines were brought in for disassembling to remove and treat the corrosion protection of these castings.

The specified use of the manufacturer's coatings systems would not provide sufficient adhesion and as such would cause the ingestion of foreign bodies into the engine, causing severe damage to them. Thus, the intake casings would have had to be left uncoated and the engines would have to be disassembled for corrosion protection and treatment of the castings.

It was decided that the AQL RCP001 Aviation White Metal Primer could provide sufficient adhesion between the substrate and the topcoat to ensure that no delamination would occur and based on this presumption, the trial commenced.

AQL Application
The two castings were cleaned as per the usual cleaning specifications of magnesium alloy, primed with AQL's RCP001 Aviation White Metal Primer, and given 10 minutes to flash off. The primer was then overcoated with Dupont Imron 700, as this was the specified coatings product.

Infield Results
In 5 months of continuous operation there has been nil reoccurrence or new outbreak of corrosion noted and nil delamination of the finish coat paint film.

Benefits
Generally these aircraft would have been decommissioned for a week to complete the abovementioned repairs. By using the RCP001 Aviation White Adhesion Promoter, the engines have been allowed to realise their full cycle life without any further treatment. Where this aircraft would generate AU$12 000 revenue per day to the customer, equating to AU$84 000 lost revenue per week, this process would now be eradicated and the loss in revenue saved.

Photographs
Note that the intake cowling had been previously coated with manufacturer specified coatings and only the green area being the Intake Casting had the AQL primer applied.

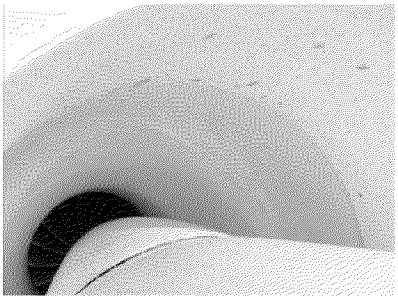


EXHIBIT GS-10

Case study

DHC2FP VH-SWB Sea Plane – Corrosion Test:

Customer : Aerocomposite
Chief Engineer : Rodney Pohlman
Aircraft : DHC2FP VH-SWB
Date : May 2007

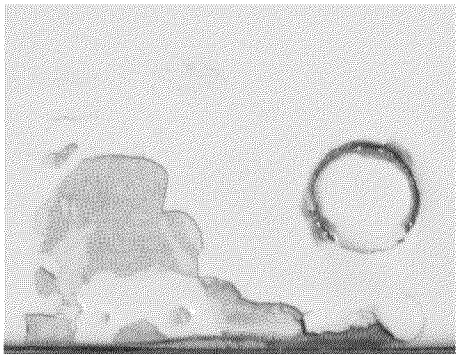
Synopsis

Filiform corrosion is generally an unavoidable problem in the aviation industry, particularly when the surface coating is broken leaving the substrate open to the elements. This occurrence of filiform corrosion on a seaplane is perhaps even more likely to occur due to the aggressive conditions that the plane, and in particularly the floats are subjected too.

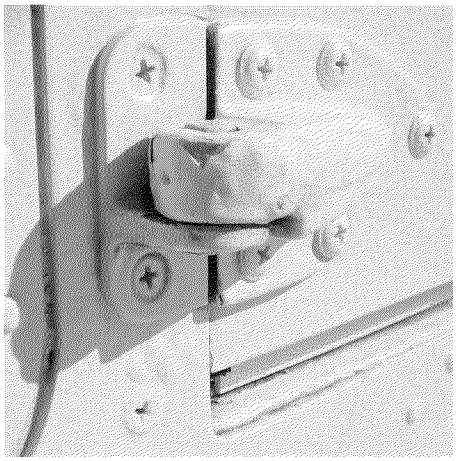
This seaplane, a DHC2FP, operates in Sydney daily, completing some 14 landings per day. Areas on this craft have been coated with RCP001 and other areas have been completed using conventional aviation primer and topcoat systems. Where the topcoat has been damaged (where RCP001 was applied) exposing bare substrate and primer, no significant formation of filiform corrosion is evident.

Results

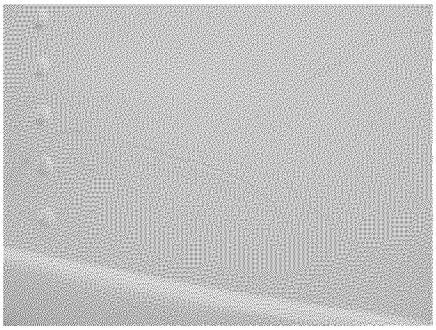
This left hand picture shows the port side rear cabin door of the seaplane.



This picture shows a damaged area of the cabin door which has been exposed to the elements. The bare substrate shows no evidence of filiform corrosion after the topcoat was damaged 12 months after the RCP001 was applied.

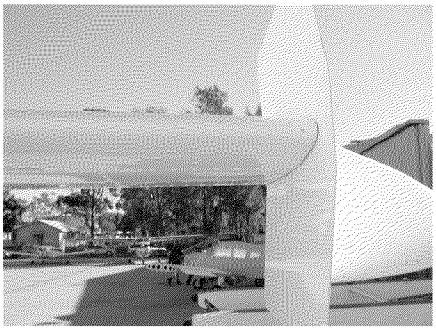


Pictured is a close up of the door hinge assembly. The hinge and forward structure was prepared and painted using standard chromate 2 pack system and the actual door skin side (right hand of picture) was prepared and painted at the same time using the AQL primer RCP001. It is evident that the left hand portioned of the door assembly is showing significant filiform corrosion, while the right hand side of the assembly unit is showing no signs of corrosion.



This picture is the aluminium float that had been damaged, brushed touched and is located below the water line.

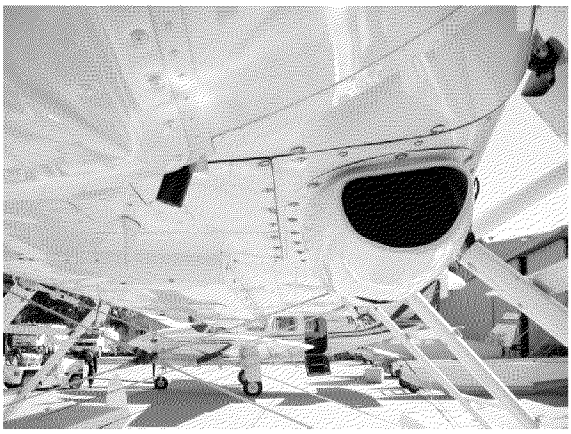
Although the surface has been broken there is no sign of filiform corrosion in this instance.



The empennage has some minor impact damage that has exposed the bare substrate.

A close-up of this damage reveals that there is zero filiform corrosion. Although this part of the plane remains predominately outside of the water it is still susceptible to filiform corrosion due to the continuous salt water spray during take off and landing.

Pictured here is the float that has suffered some impact damage along the bottom edge.



The lower access panel was not coated with RCP001 Aviation White Primer and there is significant corrosion present.

Pictured is a close up of the lower access panel, it can be clearly seen that where the dissimilar metal has instigated filiform corrosion.

Similar exposure on other parts of the aircraft (namely floats, door and empennage) indicate that had RCP001 Aviation White Primer been applied that filiform corrosion, while perhaps not prevented, would be at least limited significantly.

Float showing no signs of filiform corrosion

Conclusion:

On area where sealant was applied to the floats the primer and topcoat has delaminated which is typical due to the flexible nature of the sealant.

The filiform corrosion which appears on the door hinge assembly coated using conventional aviation coating are prone to the formation of corrosion, but where the AQL system – RCP001 has been applied has result in little or no filiform corrosion present as the comparative system were applied at the same time.

The aluminium floats are the most susceptible part of the aircraft to filiform corrosion, having been painted using the AQL primer system for 18 months, it would appear that these areas that have been coated with RCP001 Aviation White Primer have significantly delayed the onset of any form of corrosion.

This assessment can be made as the surrounding areas, which are exposed to identical conditions as those not coated with AQL's primer, show significant signs of filiform corrosion.

EXHIBIT GS-11

SYDNEY BY SEAPLANE

Flights from land and water

March 2009.

Subject: AQL Primer – A Seaplane Owner and Operator's Perspective

My interest in the Primer manufactured by AQL has been heightened by the great results which have been evident after approx 3 ½ years of continuous usage of the product.

Firstly, to give an idea as to how we operate, here are a few details:

- My aircraft is a 2 ½ ton , 8 place, amphibious Beaver Seaplane.
- This aircraft is in commercial operation in Sydney – specifically Sydney Harbour, Pittwater, the Hawkesbury River and other coastal lakes and bays.
- The aircraft flys on average 5 to 6 days per week, 48 weeks of the year.
- Each day the aircraft is returned to Bankstown Airport for routine washing, refuelling and maintenance.
- The aircraft is now 45 years old and its floats are 13 ½ years old.
- We achieve approx 3,000 flights per year with this one aircraft, of which approx 2,600 are Water Take-Offs and Landings. (A total of 5,200 departures and arrivals on the water per year.)
- The floats leave the water and arrive on the water at a speed of approx 58 knots.
- The take-off run is usually between 500 and 1200 metres.
- During the course of these take-offs and landings the floats are subject to normal hydrodynamic forces resulting from chop, swell, and boat wakes.

Approx 3 ½ years ago we repainted the sides of the floats and the planing hull skins - commencing with bare metal, alodine and deoxidine preparation, followed by the application of AQL single pack Primer. Over this, Altex marine two-pack paint has been applied.

After years of service, there has been no corrosion on any of the surfaces described above. The top coat has adhered so well that we have not witnessed any separation or peeling.

The ease of use in the application of AQL Primer and its lack of toxcicity make it an excellent product for those who apply it.

Additionally, where small and large sheet metal repairs have been made to the airframe, the same preparation and application process has provided first class durability.

One of the great additional benefits of this product is that the top coat does not have to be applied within a specific time frame, unlike other two-pack primers.

Should one have to do repairs in the field, a light coating of the primer will seal bare metal providing a long lasting anti-corrosive barrier – until the top coat can be applied.

All in all, I would not consider usage of any other primer for both my floats and airframe.

The non-hydroscopic nature of the primer (meaning that it does not absorb moisture) makes it a natural choice for marine environments and aviation purposes.

Steve Krug
Owner/Chief Pilot
PH: 0411704650

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Fax: +61 2 9974 1466 Email: info@sydneybyseaplane.com
www.sydneybyseaplane.com

EXHIBIT GS-12

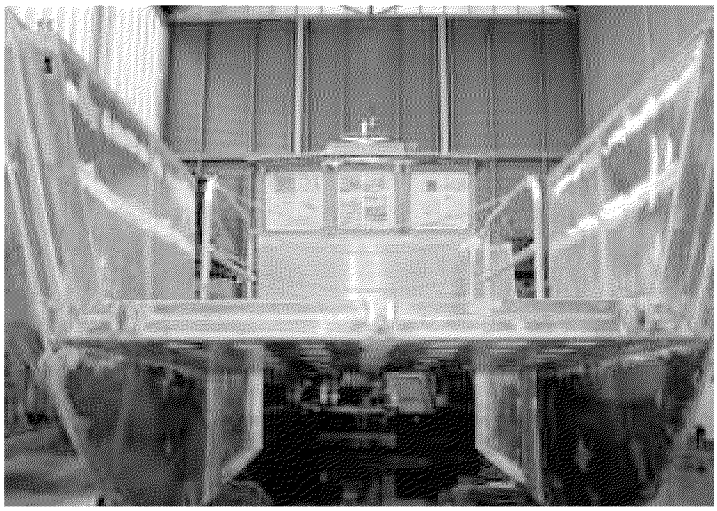
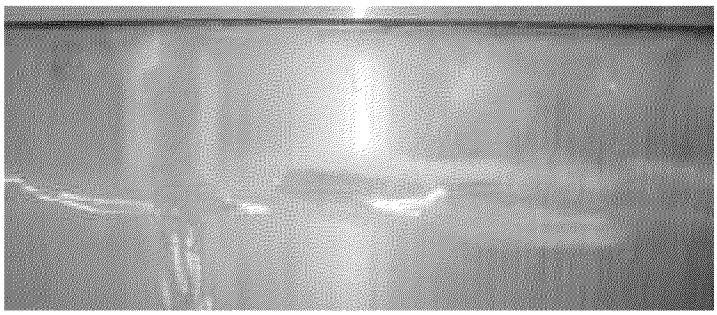
Case study

NSW Maritime
Aluminium Work Vessel

Customer : **New South Wales Maritime**
Engineer : **Leslie Brix-Nielson**
System Used : **AQL Marine Primer overcoated with International Interthane 990.**
IPC Batch #s : **G4365AB, GG4233AB, GG4327AB, GH4788AB**

Synopsis
Generally in the coating of Aluminium vessels, the abrading or blasting of aluminium substrates is required. Typical coatings systems would require a primer, intermediate primer and topcoat application. Each has a flash off time of around 12 hours and a job such as this would take around a week.

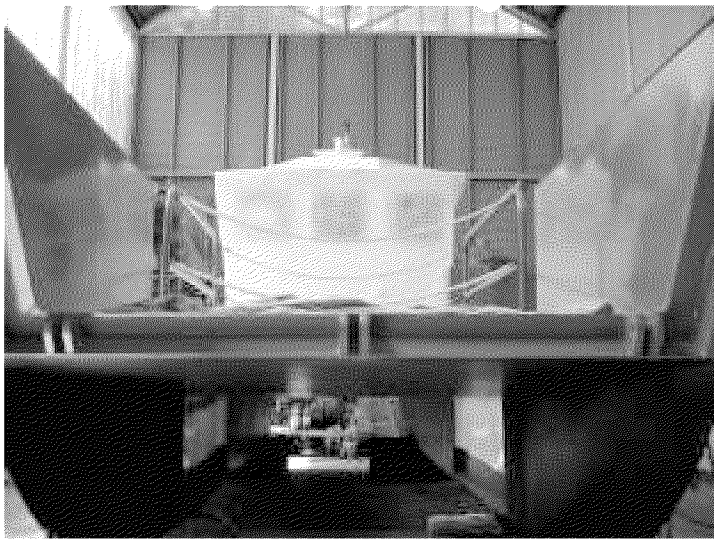
AQL Application
Using the AQL Marine Primer, no abrading of the substrate is required whatsoever. The substrates are simply cleaned and the primer applied. With only a 10 minute flash off before overcoat, production times are significantly reduced. The highly effective corrosion protection properties of the AQL Primer ensure that all filliform corrosion is prevented which naturally leads to longevity of the coating system. The Interthane 990 topcoat can be allied directly above the AQL Primer.

	Time	Action
	1.5hrs	The initial preparation including the masking of windows, seals, anodes and others by two painters.
	1.5hrs	Sanding of grounded out weld marks and large imperfections. The substrate did not have to be scoured/abraded prior to priming, only imperfections sanded out.

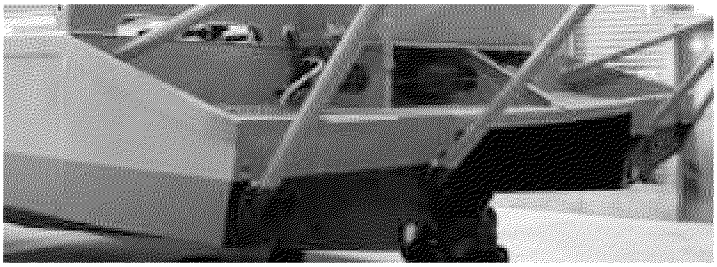
2hrs	Cleaning of aluminium with AQL CPD001 Metal Conditioner.

2hrs	Application of primer was performed by two spray painters using two 1.6mm gravity fed spray guns. 10um film build achieved by applying two coats of AQL EWS001 primer allowing 5 minutes flash off between coats. Note: EWS-001 was tinted with 10% base coat tint to assist with topcoat coverage.

Total time to application and primer flash off **7 Hours**



6hrs	Vessel overcoated with International Interthane 990.



	1.5hrs	International Antifouling was used and applied by two operators using a roller.

Total time to apply topcoats **7.5 Hours**

Total time for entire job **14.5 Hours**

Infield Results

The use of AQL Primers drastically reduces the time taken to paint vessels, and saves on topcoat usage due to the simple application of a two-coat system; it also provides increased corrosion protection ability. In addition to time saving and increased protection, a substantially less amount of product is used due to the increased coverage provided by the tintable white primer. There was also no need for an intermediate primer, which adds to the savings.

EXHIBIT GS-13

Case study 18/3/09

NSW Maritime
Aluminium Work Vessel – Follow Up

Customer : New South Wales Maritime
Engineer : Leslie Brix-Nielson
System Used : AQL Marine Primer overcoated with International Interthane 990.
IPC Batch #s : G4365AB, GG4233AB, GG4327AB, GH4788AB
Date Painted : 2/3/07
Date Followed up : 13/3/09

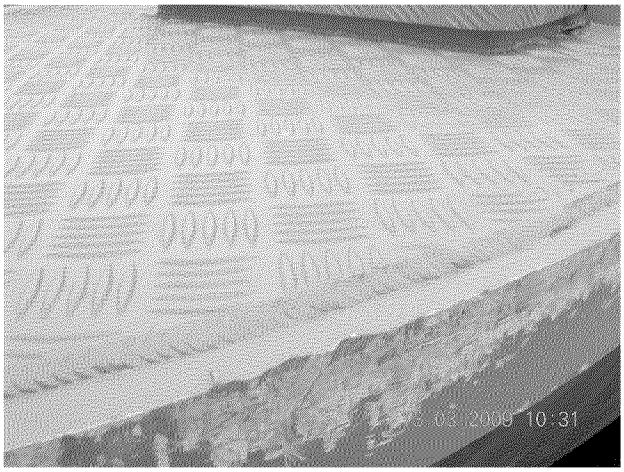
Synopsis

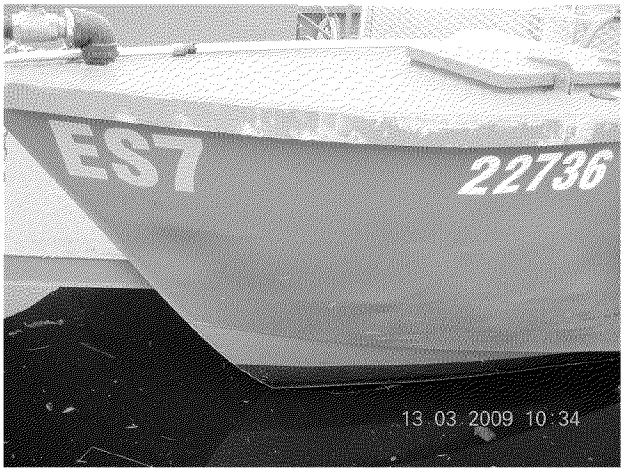
The vessel was painted just over two years before these observations took place. Of particular interest was how the AQL primer has fared over the course of two years in terms of both adhesion and corrosion protection. The original process involved a process of cleaning, an application of the AQL primer and a topcoat which was completed just over two years prior to the follow up.

Notes

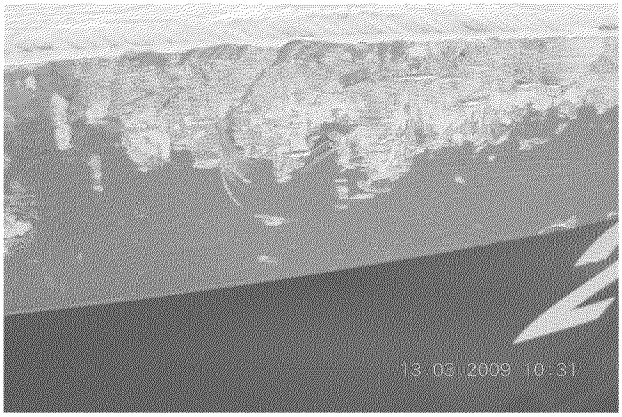
The January 2009 service was the first major work completed on the vessel since it was originally fitted out. This work was predominantly engine based; the paint work was not attended to at this point.
The vessel was pressure cleaned when removed from the water. The paint work remained in tact as did the antifouling (growth was removed), despite the presence of exposed areas. This indicated that the adhesion of the primer was not compromised. Another coat of antifouling was applied.
The vessel is cleaned on a daily basis using a hose (very low pressure) and salt water as a means of keeping it clean. On a semi-regular basis (once a week
The vessel (as a garbage trawler) operates for 11 hours a day, mostly 7 days a week.
There is obvious wear underneath the two floats where they are subject to running ashore on a daily basis. Where there is exposure, there is still no need to recoat as the vessel runs ashore on a regular basis and would be liable to remove the coating time and again.

The vessel was re-coated midway through 2008, the process used was i) high pressure clean ii) apply topcoat (no primers were used, the AQL primer remained the contact point between substrate and coatings.

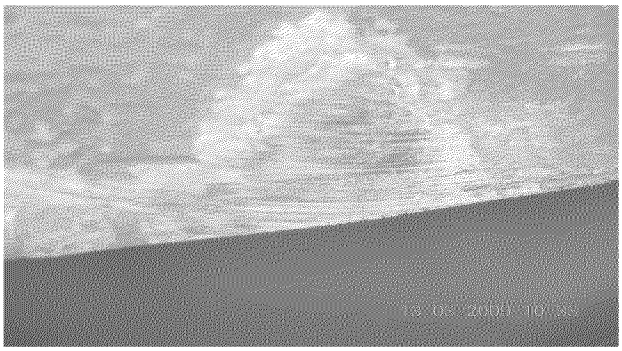
Image	Observations
	This deck has been repainted in the last two years. No additional primers were used on top of the existing AQL primer. It was simply cleaned and painted (with wear and tear expected).



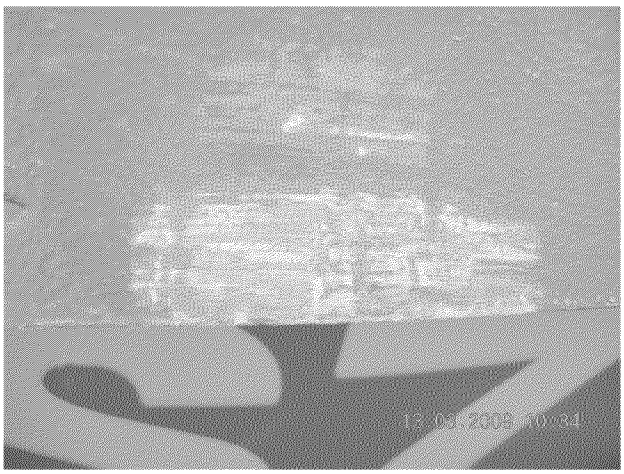
This shot was taken to demonstrate the level of bumps and scratches that the vessel encounters on a daily basis.



A close up demonstrates that there is no discernable signs of delamination or undercreep despite the exposed surface.



A further close up shows little to no corrosion. This indicates that the primer is still in tact below the painted surface.



Ordinarily this kind of exposure would have been prone to filiform corrosion spreading from the exposed metal to beneath the paint layer.

This deck has been repainted, but shows signs only of wear and tear.

Conclusion

Over the course of two years, the Maritime vessel has been in operation for a minimum of 3500 hours. Aside from the day to day operation, the vessel permanently resides in the ocean. Based on past experience, the Maritime would ordinarily expect filiform corrosion to be of major concern. Even in the exposed areas (of which there are a number), there is little to no corrosion evident.

EXHIBIT GS-14

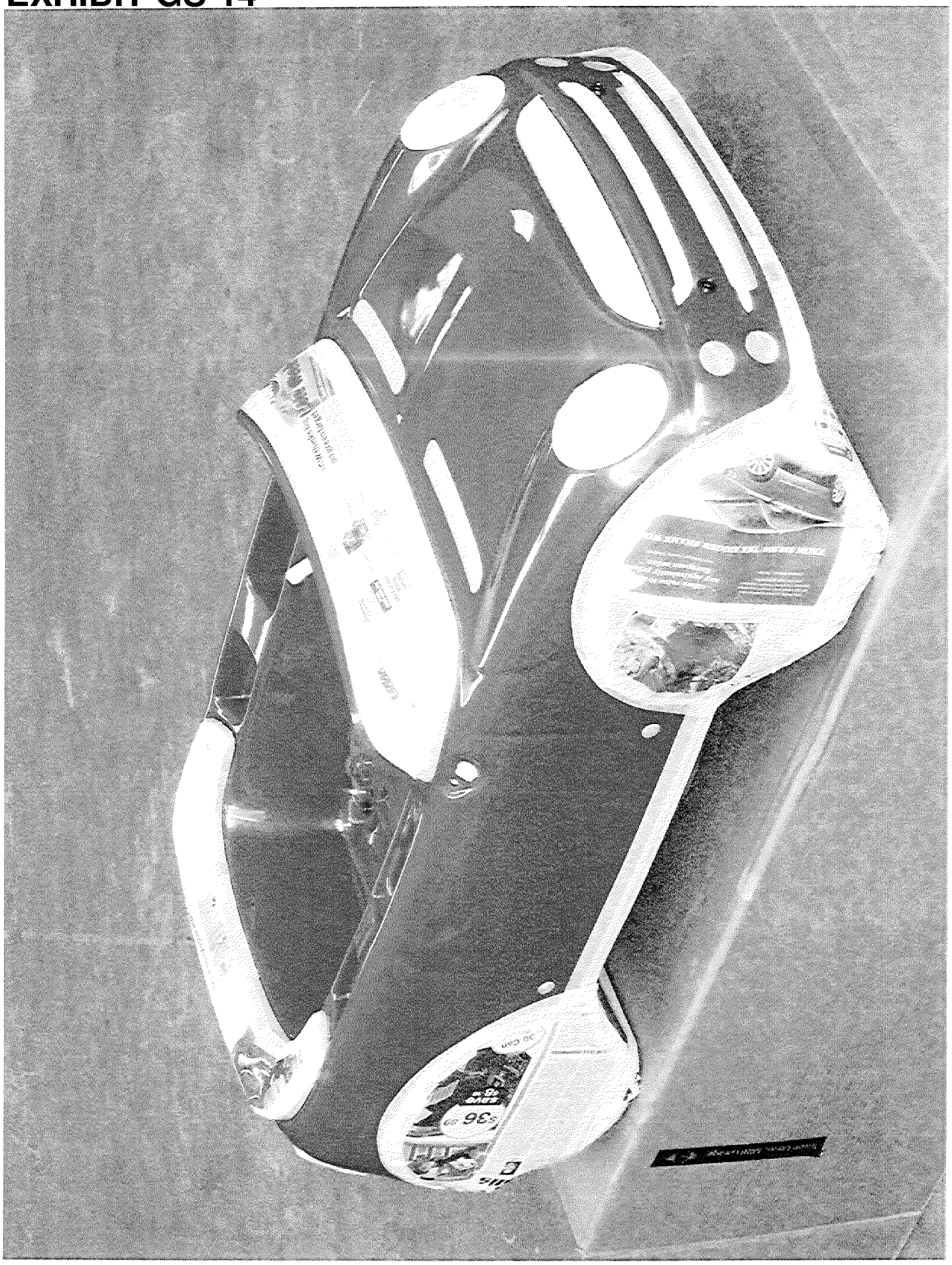


EXHIBIT GS-15

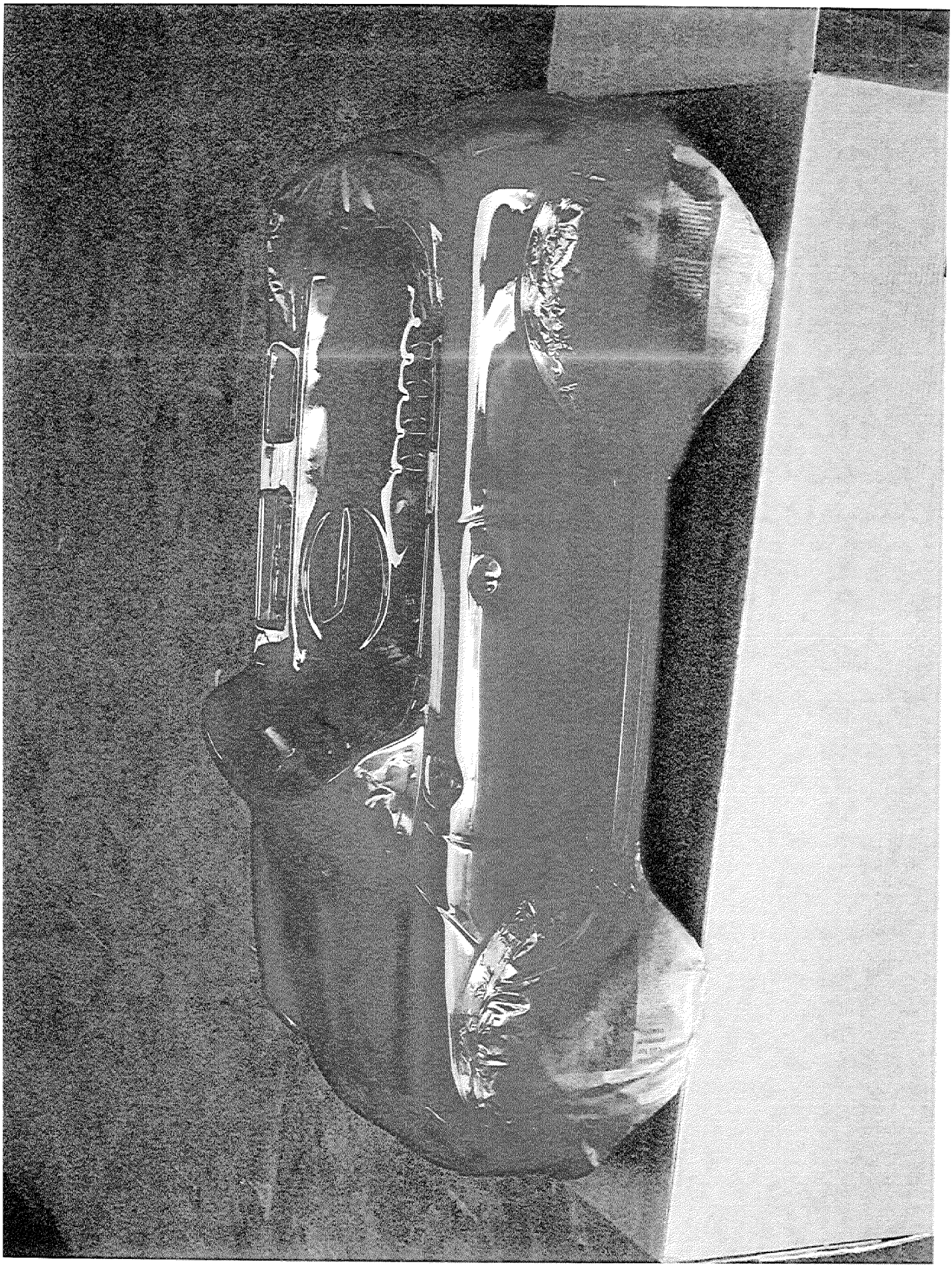


EXHIBIT GS-16

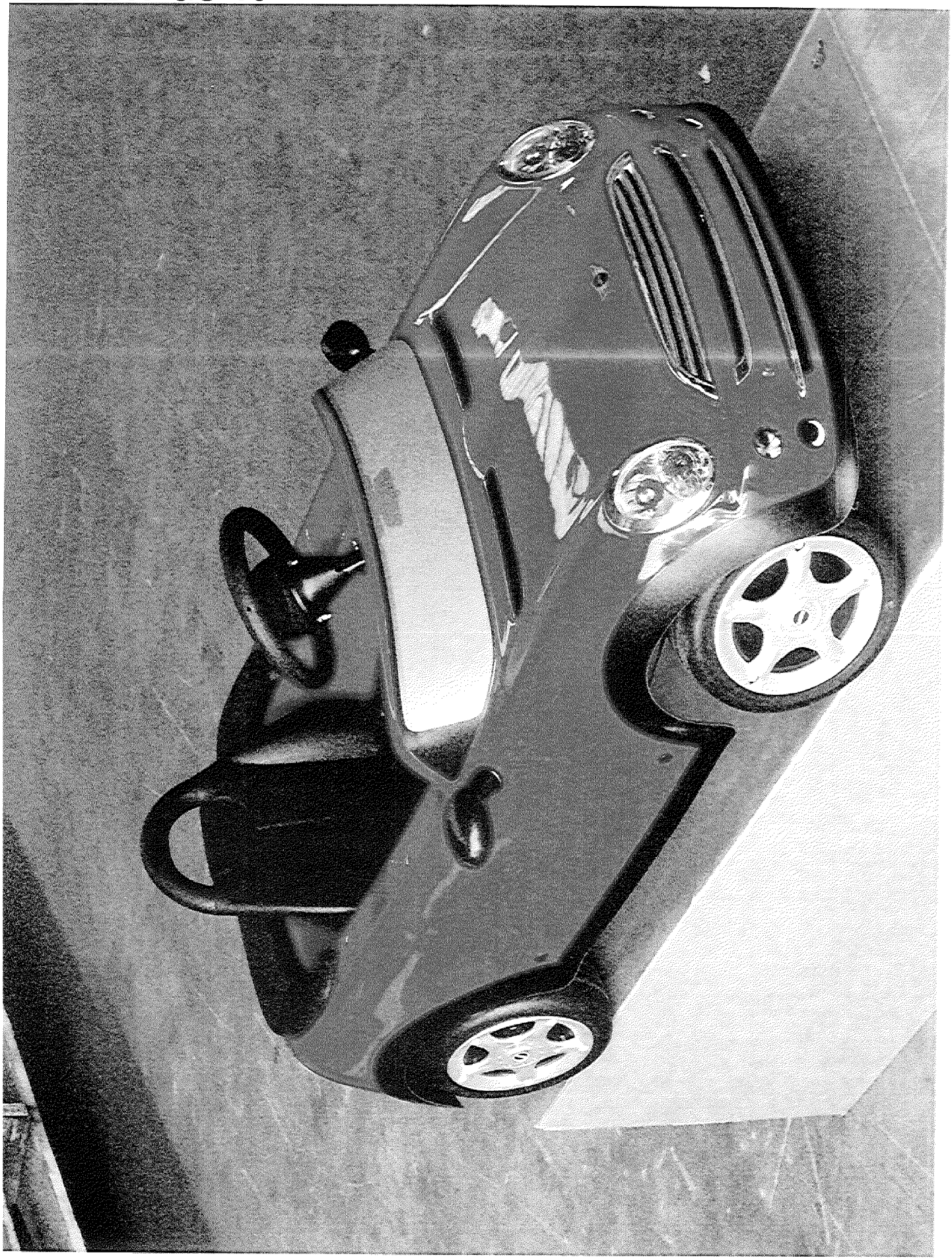


EXHIBIT GS-17

EXHIBIT GS-18